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EXAMINER

NAHAR, QAMRUN

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 09/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/827,838

Applicant(s)

PLUMER ET AL.

Examiner

Qamrun Nahar

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 April 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 05/11/01, 01/21/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. Claims 1-62 have been examined.

#### ***Drawings***

2. Figures 13, 23 and 25 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Claim Objections***

3. Claim 42 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitations in lines 3-6 of claim 42 are substantially recited in lines 7-10 of claim 41.

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 9, 31-38, 49, 57-58 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 9 recites the limitation "said creating the optimization program" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim. Therefore, this limitation is interpreted as "said constructing the optimization program".

7. Claim 31 recites the limitation "the optimization program" in line 5 of the claim. There is insufficient antecedent basis for this limitation in the claim. Therefore, this limitation is interpreted as "an optimization program".

Claims 32-38 are rejected for dependency upon rejected base claim 31 above.

8. Claim 49 is replete with insufficient antecedent basis, i.e. "the first solution". Claim 49 is depending on claim 43 inadvertently, where claim 49 should be depending on claim 48. Therefore, claim 49 is interpreted as depending on claim 48.

9. The term "substantially" in claim 57 is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The limitation "conform to the trajectory" on line 5 of the claim has been rendered indefinite because it is unascertainable what other factors and/or elements the process is conforming to.

Claim 58 is rejected for dependency upon rejected base claim 57 above.

***Claim Rejections - 35 USC § 101***

10. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

11. Claims 41-42 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As per claim 41, merely claimed as a computer-readable medium storing a program representing a computer listing *per se* (memory medium comprising program instructions), that is, descriptions or expressions of such a program and that is, descriptive material *per se*, non-functional descriptive material, and is not statutory because it is not a physical "thing" nor a statutory process, as **there are not "acts" being performed**. Such claimed programs do not define any structural and functional interrelationships between the program and other claimed aspects of the invention which permit the program's functionality to be realized, unless the program is executed. Particularly, the limitations on lines 7-10 of the claim *does not define structural and functional interrelationships between the program and the medium* which permit the program's functionality to be realized, and is thus not statutory. That is, the limitations on lines 7-10 of the claim does not recite actual step.

In contrast, instead of reciting "are operable to be created", if the limitation is amended to recite "created", which defines structural and functional interrelationships between the program and the medium which permit the program's functionality to be

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realized, and is thus statutory. **Warmerdam**, 33 F.3d at 1361, 31 USPQ2d at 1760. **In re Sarkar**, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978). See MPEP § 2106(IV)(B)(1)(a).

As per claim 42, this claim is rejected for dependency on the above rejected non-statutory claim 41.

***Claim Rejections - 35 USC § 102***

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 1-19, 22-35, 38-47 and 50-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Clark (U.S. 6,411,922).

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**Per Claim 1:**

The Clark patent discloses:

- a method for enabling a user to create a program for controlling a process, wherein the method operates in a system including a computer system which is coupled to the process, the method comprising: providing a plurality of software classes for modeling, optimization, and deployment; providing one or more

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**management facilities for managing the plurality of software classes** (“A preferred embodiment resource optimization system in accordance with the present invention comprises a problem modeler having an interface for retrieving user data objects and object relationships describing a user application from a user information resource, a solver database to which the problem modeler has an interface for storing optimization metrics derived from the user data objects and object relationships by the problem modeler, and a problem solver having an interface to the solver database for retrieving the optimization metrics for solving resource optimization problems for the user application.” in column 2, lines 64-67 to column 3, lines 1-7)

**- creating a plurality of software objects based on the plurality of software classes; and constructing an optimization program which uses the plurality of software objects, wherein said constructing is performed in response to user input; wherein the optimization program is useable in controlling the process** (“Problem solver 208 directly accesses the mathematical model of a problem, generally comprising matrices, objective and cost functions, and constraints, from solver database 206. Solver database 206 contains an abstract representation of the data stored in information resource 222. API 210 provides the interface between problem solver 208 and user application program 212 for translating data into the proper software protocol understood by the respective program. During operation, user application 212 sends solution request 214 to problem solver 208. Problem solver 208 calculates an optimal solution for solution request 214 by applying an optimization technique to solution request 214, subject to the problem model

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stored in solver database 206, and then returns optimized solution result 216 to user application 212.” in column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 2:**

The Clark patent discloses:

- wherein the plurality of software classes include at least one of a modeling class, a simulation class, and an optimization class (column 2, lines 64-67 to column 3, lines 1-7).

**Per Claim 3:**

The Clark patent discloses:

- wherein the plurality of software classes include at least two of a modeling class, a simulation class, and an optimization class (column 2, lines 64-67 to column 3, lines 1-7).

**Per Claim 4:**

The Clark patent discloses:

- wherein the plurality of software classes further include two or more of: a visualization class, a deployment class, an execution class, a configuration class, a communication class, a reporting class, a management class, an archiving class, a



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**pre-processing class, and a post-processing class (column 2, lines 64-67 to column 3, lines 1-7).**

**Per Claim 5:**

The Clark patent discloses:

- wherein the plurality of software classes include a modeling class and an optimization class; wherein said creating the plurality of software objects comprises creating a modeling object and an optimization object; wherein said constructing the optimization program comprises constructing the optimization program using the modeling object and the optimization object (column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 6:**

The Clark patent discloses:

- wherein the plurality of software objects are instances of two or more of the plurality of software classes; wherein the plurality of software objects comprise primitives that are useable in creating higher level programs (column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 7:**

The Clark patent discloses:

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- further comprising: executing the optimization program, wherein said executing comprises executing the plurality of software objects to optimize the process (column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 8:**

The Clark patent discloses:

- wherein said executing the optimization program further comprises: the plurality of software objects communicating with each other using event triggered execution (column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 9 (as best understood):**

The Clark patent discloses:

- wherein said constructing the optimization program comprises creating a decision engine, wherein the decision engine comprises an encapsulation of knowledge and decision making logic; wherein the decision engine comprises two or more of a modeling object, a simulation object and an optimization object; wherein the decision engine comprises a modular and portable component (column 6, lines 1-15 and lines 23-37).

**Per Claim 10:**

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The Clark patent discloses:

- wherein the one or more management facilities comprise one or more of: a global naming facility, a storage and retrieval facility, a cataloging and location facility, a project grouping facility, a deployment facility, a revision tracking facility, and a visualization management facility (column 6, lines 1-15).

**Per Claim 11:**

The Clark patent discloses:

- wherein the optimization program is operable to perform optimization for two or more of: continuous processes, batch processes and discrete processes (column 7, lines 3-13).

**Per Claim 12:**

The Clark patent discloses:

- wherein the optimization program is operable to perform control functions for two or more of: continuous processes, batch processes and discrete processes (column 7, lines 3-13).

**Per Claim 13:**

The Clark patent discloses:

- wherein said creating a plurality of software objects includes creating a model software object that combines a first-principles model and an empirical model (column 5, lines 28-38).

**Per Claim 14:**

The Clark patent discloses:

- wherein said creating a plurality of software objects includes creating a model software object that combines two or more of: a first-principles model, an empirical model, and a procedural model (column 5, lines 28-38).

**Per Claim 15:**

The Clark patent discloses:

- wherein said creating a plurality of software objects comprises: creating a dynamic process model object; creating a solver object; wherein the optimization program is constructed including the dynamic process model object and the solver object, wherein the dynamic process model object and the solver object operate together to optimize the process (column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 16:**

The Clark patent discloses:

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- wherein said creating a plurality of software objects further comprises: creating a problem formulation object that describes a problem; wherein the optimization program is constructed including the problem formulation object; wherein the solver object uses information from the problem formulation object in optimizing the process (column 5, lines 28-38).

**Per Claim 17:**

The Clark patent discloses:

- wherein the dynamic process model object comprises one of a first principles model, a linear model, a non-linear model, or a hybrid model; wherein the solver object comprises one of a nonlinear programming solver, a mixed integer nonlinear programming solver, or an evolutionary solver (column 5, lines 28-38; and column 6, lines 53-67 to column 7, lines 1-2).

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**Per Claim 18:**

The Clark patent discloses:

- wherein said creating a plurality of software objects further comprises: creating a pre-processing object; wherein the optimization program is constructed including the pre-processing object; wherein the pre-processing object is operable to pre-

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**process data prior to provision of the data to the dynamic process model object or the solver object (column 5, lines 28-38).**

**Per Claim 19:**

The Clark patent discloses:

**- wherein said creating a plurality of software objects further comprises: creating a post-processing object; wherein the optimization program is constructed including the post-processing object; wherein the post-processing object is operable to post-process data received from one or more of the dynamic process model object or the solver object (column 6, lines 38-52).**

**Per Claim 22:**

The Clark patent discloses:

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**- further comprising: creating a user interface component for the optimization program; and associating the user interface component with the optimization program (column 5, lines 39-58).**

**Per Claim 23:**

The Clark patent discloses:

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- wherein the process comprises one of: an enterprise, a manufacturing operation, or an e-commerce system (column 6, lines 1-15).

**Per Claim 24:**

This is a control system version of the claimed method discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above, including “wherein the plurality of software objects inherit functionality from one or more of the plurality of software classes; and a control program created using the plurality of software objects; wherein the control program is operable to control the process” (column 4, lines 60-67 to column 5, lines 1-7). Thus, accordingly, this claim is also anticipated by Clark.

**Per Claims 25-30:**

These are control system versions of the claimed method discussed above (claims 3-5, 8-9, and 11, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Clark.

**Per Claims 31-35, 38 (as best understood) & 39:**

These are control system versions of the claimed method discussed above (claims 15-19 and 22-23, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Clark.

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**Per Claim 40:**

The Clark patent discloses:

**- wherein the control system comprises a plurality of computer systems interconnected via a network (column 7, lines 15-31).**

**Per Claims 41-42:**

These are memory medium versions of the claimed method discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Clark.

**Per Claim 43:**

This is another version of the claimed method discussed above (claims 1 and 15), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also anticipated by Clark.

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**Per Claims 44-47:**

These are another versions of the claimed method discussed above (claims 16-19, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Clark.



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**Per Claims 50-51:**

These are another versions of the claimed method discussed above (claims 22-23, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Clark.

**Per Claim 52:**

The Clark patent discloses:

- **a method for modeling a process, wherein the method operates in a system including a computer system** (column 2, lines 64-67 to column 3, lines 1-7)
  - **creating a software program that implements a model, wherein the model combines aspects of a first-principles model and an empirical model; executing the software program to model the process** (column 5, lines 28-38).
- 

**Per Claim 53:**

The Clark patent discloses:

- **wherein said executing comprises executing aspects of the first-principles model and the empirical model** (column 5, lines 28-38).

**Per Claim 54:**

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The Clark patent discloses:

- **further comprising: training the model, wherein said training uses empirical data and first-principles information** (column 5, lines 28-38).

**Per Claim 55:**

The Clark patent discloses:

- **further comprising: identifying parameters of the first-principles model based on empirical data, wherein said identifying uses nonlinear empirical modeling techniques** (column 5, lines 28-38 and column 6, lines 23-37).

**Per Claim 56:**

The Clark patent discloses:

- 
- **wherein the model combines aspects of a first-principles model, an empirical model, and a procedural model** (column 5, lines 28-38).

**Per Claim 57 (as best understood):**

The Clark patent discloses:

- **a method for optimizing a process** (column 2, lines 64-67 to column 3, lines 1-7)

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- receiving user input which configures constraints and targets of the process as a trajectory; controlling the process based on the configured constraints and targets of the process, wherein the process is controlled to conform to the trajectory (column 4, lines 60-67 to column 5, lines 1-7).

**Per Claim 58 (as best understood):**

The Clark patent discloses:

- wherein said controlling the process comprises optimizing the process according to the configured constraints and targets of the process, wherein the process is optimized according to the trajectory (column 4, lines 60-67 to column 5, lines 1-7).

***Claim Rejections - 35 USC § 103***

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 20-21, 36-37, 48-49 and 59-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clark (U.S. 6,411,922) in view of Walser (U.S. 6,731,998).

**Per Claim 20:**

The rejection of claim 15 is incorporated, and further, Clark does not explicitly teach wherein the dynamic process model object and the solver object comprise a first

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solution that controls a first process; the method further comprising: creating a model of the first solution; creating a second solution, wherein the second solution comprises a second dynamic process model object, a second solver object, and the model of the first solution, wherein the second solution which operates to control a second process, wherein the second solution affects the first solution; wherein the second solution uses the model of the first solution to determine how the first solution will respond to actions provided by the second solution. Walser teaches wherein the dynamic process model object and the solver object comprise a first solution that controls a first process; the method further comprising: creating a model of the first solution; creating a second solution, wherein the second solution comprises a second dynamic process model object, a second solver object, and the model of the first solution, wherein the second solution which operates to control a second process, wherein the second solution affects the first solution; wherein the second solution uses the model of the first solution to determine how the first solution will respond to actions provided by the second solution (column 1, lines 63-67 to column 2, lines 1-15).

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It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Clark to include wherein the dynamic process model object and the solver object comprise a first solution that controls a first process; the method further comprising: creating a model of the first solution; creating a second solution, wherein the second solution comprises a second dynamic process model object, a second solver object, and the model of the first solution, wherein the second solution which operates to control a second process, wherein the second solution affects the first solution; wherein the second solution uses the model of

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the first solution to determine how the first solution will respond to actions provided by the second solution using the teaching of Walser. The modification would be obvious because one of ordinary skill in the art would be motivated to efficiently control multi-stage processes.

**Per Claim 21:**

The rejection of claim 20 is incorporated, and Walser further teaches the second solution using the model of the first solution to dynamically determine how the first solution will respond to actions provided by the second solution; and the second solution controlling the first solution based on a determination of how the first solution will respond to actions provided by the second solution (column 2, lines 8-15).

**Per Claims 36-37:**

These are control system versions of the claimed method discussed above (claims 20-21, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

**Per Claims 48 & 49 (as best understood):**

These are another versions of the claimed method discussed above (claims 20-21, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

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**Per Claims 59-60:**

These are another versions of the claimed method discussed above (claims 20-21, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

**Per Claims 61-62:**

These are another versions of the claimed method discussed above (claims 48-49, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

***Conclusion***

16. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (703) 305-7699 ***if calling before October 28, 2004***; otherwise ***if calling on or after October 28, 2004***, then the telephone number is (571)272-3730. The examiner can normally be reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QN  
September 1, 2004

*Kakali Chak*  
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TECHNOLOGY CENTER 2100